

We claim:

1. A portable work capacities testing apparatus, comprising:
  - a portable computer;
  - a portable dynamic strength and lifting device releaseably interconnected with
  - 5 said portable computer;
  - a portable hand grip strength device releaseably interconnected with said portable computer;
  - a portable finger pinch strength device releaseably interconnected with said portable computer;
  - 10 a portable forearm/wrist strength device releaseably interconnected with said portable computer;
  - a portable handling/proprioception device releaseably interconnected with said portable computer;
  - a portable finger flexion device releaseably interconnected with said portable
  - 15 computer;
  - a portable whole body coordination device releaseably interconnected with said portable computer;
  - a portable strength push/pull/lift device releaseably interconnected with said portable computer.
- 20 2. The apparatus of claim 1, further comprising a hub releaseably interconnected with said portable computer, wherein said dynamic strength and lifting device, said hand grip strength device, said finger pinch strength device, said forearm/wrist strength device, said handling/proprioception device, said finger flexion device, said whole body coordination device, and said strength push/pull/lift device,
- 25 are individually releaseably interconnected with said hub.
3. The apparatus of claim 1, wherein one or more of said releaseably interconnected devices comprise an integrated device, and wherein one or more of said releaseably interconnected devices comprise a non-integrated device wherein one or more of said one or more non-integrated devices comprise a data acquisition
- 30 system and a USB interface.
4. The apparatus of claim 1, wherein one or more of said releaseably interconnected devices comprise a static strength device, and wherein one or more of

said releaseably interconnected devices comprise a dynamic strength device, and wherein one or more of said releaseably interconnected devices comprise a work performance device.

5        5.        The apparatus of claim 1, further comprising:  
a monopole;

a shuttle movably disposed on said monopole, wherein said whole body coordination device, said push/pull/lift device, or said dynamic strength and lifting device, can be releaseably mounted on said monopole.

10       6.        The apparatus of claim 5, wherein said monopole is formed to include  
an aperture extending through a first end, further comprising:

a floor platform;

a first bracket attached to a first end of said floor platform;

a second bracket attached to said first end of said floor platform;

15       a crossbolt which can be disposed through said first bracket, through said  
aperture in said monopole, and through said second bracket, thereby releaseably  
fixturing said floor platform to monopole.

7.        The device of claim 6, further comprising one or more fasteners  
capable of permanently affixing said monopole to a vertical surface.

20       8.        The apparatus of claim 6, further comprising:  
a top door hook capable of being removeably attached to the top portion of a  
door;

a bottom door hook capable of being removeably attached to the bottom  
portion of a door;

25       a door frame rail disposed between and releaseably attached to said top door  
hook and to said bottom door hook;

wherein said monopole can be releaseably attached to said door frame rail.

30       9.        The apparatus of claim 8, wherein said door frame rail comprising a  
top end and a bottom end, further comprising a floor platform comprising a non-slip  
surface, wherein said floor assembly can be releaseably attached to said bottom end of  
said door frame rail.

10.       A finger flexion device for use in a work capacities testing apparatus,  
comprising:

a panel;  
a finger touch pad light disposed on said panel, wherein said finger touch pad light can be selectively illuminated;  
a finger touch pad disposed on said panel adjacent said finger touch pad light;  
5 a first palm rest location disposed on said panel adjacent said finger touch pad;  
and  
a second palm rest location disposed on said panel adjacent said finger touch pad.

11. The apparatus of claim 10, wherein said finger flexion device isolates  
10 finger movement from wrist movement and arm movement.

12. The apparatus of claim 10, wherein said finger flexion device further comprises a sense field extending outwardly from said panel for about 1 centimeter, wherein said sense field is capable of detecting the intrusion of a human finger into said sense field.

13. A handling/proprioception device for use in a work capacities testing  
15 apparatus, comprising:

a first panel;

a pin;

a first light emitter disposed on said first panel, wherein said first light emitter  
20 is capable of being selectively illuminated, wherein said first panel is formed to include a first aperture adjacent said first light emitter, and wherein said pin can be removeably inserted into said first aperture;

a second light emitter disposed on said first panel, wherein said second light emitter is capable of being selectively illuminated, wherein said first panel is formed  
25 to include a second aperture adjacent said second light emitter, and wherein said pin can be removeably inserted into said second aperture;

a third light emitter disposed on said first panel, wherein said third light emitter is capable of being selectively illuminated, wherein said first panel is formed to include a third aperture adjacent said third light emitter, and wherein said pin can  
30 be removeably inserted into said third aperture; and

a fourth light emitter disposed on said first panel, wherein said fourth light emitter is capable of being selectively illuminated, wherein said panel is formed to

include a fourth aperture adjacent said fourth light emitter, and wherein said pin can be removeably inserted into said fourth aperture.

14. The apparatus of claim 13, wherein said handling/proprioception device further comprises a faceted object comprising a plurality of faces, wherein  
5 each of said plurality of faces comprises different visually observable information, wherein said handling/proprioception device is formed to include a fifth aperture dimensioned to receive said cube.

15. The apparatus of claim 14, further comprising a finger flexion device comprising a second panel; a finger touch pad light disposed on said second panel,  
10 wherein said finger touch pad light can be selectively illuminated; a finger touch pad disposed on said second panel adjacent said finger touch pad light; a first palm rest location disposed on said second panel adjacent said finger touch pad; and a second palm rest location disposed on said second panel adjacent said finger touch pad.

16. The apparatus of claim 15, further comprising:  
15 a data acquisition system comprising a USB interface;  
a first voltage regulator;  
a second voltage regulator;  
a third voltage regulator;  
a decoder interconnected with said data acquisition system, said first voltage  
20 regulator, said second voltage regulator, and said third voltage regulator, wherein said decoder selectively activates one or more voltage regulators;

faceted object sensors and LED circuitry interconnected with said first voltage regulator, wherein said faceted object sensors and LED circuitry is capable of determining the orientation of said cube;

25 pin sensor circuitry interconnected with said second voltage regulator, wherein said PIN sensors and LED circuitry is capable of sensing pin placement;

handling touch pad circuitry interconnected with said second voltage regulator, wherein said handling touch pad circuitry is capable of determining when a user touches said second panel; and

30 finger touch pad and touch pad circuitry interconnected with said third voltage regulator, wherein said finger touch pad and touch pad circuitry is capable of determining when a user touches said first panel.

17. A finger pinch strength device for use in a work capacities testing apparatus, comprising:

- a portable housing;
- a depressable member disposed on said housing;
- 5 a load cell disposed within said housing; and
- a whetstone bridge disposed between said depressable member and said load cell.

18. The apparatus of claim 17, wherein said finger pinch strength device further comprises:

- 10 an analog to digital converter interconnected with said load cell;
- a voltage regulator interconnected with said analog to digital converter;
- a microcontroller interconnected with said analog to digital converter and to said voltage regulator;
- a USB interface interconnected with said microcontroller and with said
- 15 portable computer.

19. A hand grip strength device for use in a work capacities testing apparatus, comprising:

- a first housing portion having a first end and a second end;
- a second housing portion having a first end and a second end;
- 20 a pivot ring disposed between, and attached to, said first end of said first housing portion and said first end of said second housing portion;
- a load cell disposed between said first housing portion and said second housing portion; and
- a member interconnecting said first housing portion to said load cell.

- 25 20. The apparatus of claim 19, further comprising:
- an analog to digital converter interconnected with said load cell;
- a voltage regulator interconnected with said analog to digital converter;
- a microcontroller interconnected with said analog to digital converter and to said voltage regulator;
- 30 a USB interface interconnected with said microcontroller and with said portable computer.

21. A whole body coordination device for use in a work capacities testing apparatus, comprising:

a panel;

a first hand-held wand flexibly interconnected at a first end to said panel;

5 a second hand-held wand flexibly interconnected at a first end to said panel;  
a plurality of touch pad locations disposed on said panel;

a plurality of light emitters, wherein a different one of said plurality of light emitters is disposed adjacent a different one of said plurality of touch pad locations.

22. The apparatus of claim 21, further comprising an enclosure, wherein  
10 said panel comprises one side of said enclosure, and wherein:

said first hand-held wand comprises an electromagnet disposed on the second end;

said second hand-held wand comprises an electromagnet disposed on the second end;

15 said plurality of touch pad locations are disposed within said enclosure;

said plurality of light emitters are disposed within said enclosure, wherein a different one of said plurality of light emitters is disposed around a different one of said plurality of touch pad locations;

said panel comprises a translucent surface.

20 23. The apparatus of claim 21 or claim 22, wherein said whole body coordination device further comprises:

a data acquisition system comprising a USB interface;

an address decoder interconnected with said data acquisition system, wherein said address decoder selectively selects a target wand and a target touch pad location;

25 wand control circuitry interconnected with said address decoder, wherein said wand control circuitry is capable of determining if a target wand is touching a touch pad location; and

touch plate and LED circuitry interconnected with said address decoder, wherein said touch plate and LED circuitry is capable of sensing if a target touch pad  
30 location has been touched by a wand.

24. A forearm/wrist strength device for use in a work capacities testing apparatus, comprising:

a platform base having a first end and a second end;  
a shuttle assembly moveably disposed on said first end of said platform base;  
a sensing unit disposed at said second end of said platform base;  
an immobilization device attached to said shuttle assembly.

5        25.     The apparatus of claim 24, wherein said forearm / wrist strength device comprises a multi-axis, isometric strength testing device.

26.     The apparatus of claim 24, wherein said immobilization device comprises two semicircular halves that hingedly open.

10       27.     The apparatus of claim 24, wherein said shuttle is formed to include a plurality of apertures, further comprising:

      a first post assembly comprising a first cylindrical member having a first diameter; a second cylindrical member having a second diameter, wherein said second cylindrical member is disposed on one end of said first cylindrical member and extends outwardly therefrom, and wherein said first diameter is greater than said  
15       second diameter;

      a second post assembly comprising a first cylindrical member having a first diameter; a second cylindrical member having a second diameter, wherein said second cylindrical member is disposed on one end of said first cylindrical member and extends outwardly therefrom, and wherein said first diameter is greater than said  
20       second diameter;

      wherein said first post assembly can be removeably inserted into any of said plurality of apertures, and wherein said second post assembly can be removeably inserted into any of said plurality of apertures.

25       28.     The apparatus of claim 27, further comprising:  
      a first flexible covering disposed around said first post assembly; and  
      a second flexible covering disposed around said second post assembly.

29.     The apparatus of claims 26 or 27, further comprising a data acquisition system comprising a USB interface.

30.     The apparatus of claim 29, further comprising a controller.

30       31.     A portable dynamic lifting and carrying device for use in a work capacities testing apparatus, comprising:

      a potentiometer disposed at a first height;

a lift container comprising a known weight and formed to include a retainer angle, wherein said lift container is flexibly interconnected to said potentiometer;

a scale disposed at a second height, wherein said lift container is initially disposed on said scale;

5 a lift plate disposed at a third height, wherein said lift plate is formed to releaseably receive said retainer angle;

wherein said potentiometer is capable of measuring the lift velocity of said lift container; and

10 wherein said first height and said third height are greater than said second height.

32. The apparatus of claim 31, further comprising a data acquisition system comprising a USB interface.

33. The apparatus of claim 32, further comprising a controller.

15 34. A strength push/pull/lift device for use in a work capacities testing apparatus, comprising:

a first force handle assembly

a first housing, wherein said first force handle assembly is attached to said first housing such that said first force handle assembly extends outwardly from said first housing in a first direction;

20 a first load cell mechanically disposed within said first housing and mechanically interconnected to said first force handle assembly;

a first force handle base attached to said first housing and extending outwardly therefrom in a second direction, wherein said first direction is opposite said second direction;

25 a second force handle assembly;

a second housing, wherein said second force handle assembly is attached to said second housing such that said first force handle assembly extends outwardly from said second housing in said first direction;

30 a second load cell mechanically disposed within said second housing and mechanically interconnected to second first force handle assembly;

a second force handle base attached to said second housing and extending outwardly therefrom in said second direction;



a force arm interconnecting said first force handle base and said second force handle base along a third direction, wherein said third direction is orthogonal to said first direction and said second direction.

35. The apparatus of claim 34, wherein said first force handle base can be  
5 releaseably attached to said force arm such that said first force handle assembly extends upwardly from said first housing, and wherein said second force handle base can be releaseably attached to said force arm such that said second force handle assembly extends upwardly from said second housing.

36. The apparatus of claim 35, wherein said first force handle base can be  
10 releaseably attached to said force arm such that said first force handle assembly extends downwardly from said first housing, and wherein said second force handle base can be releaseably attached to said force arm such that said second force handle assembly extends downwardly from said second housing.

37. The apparatus of claim 36, wherein said first force handle base can be  
15 releaseably attached to said force arm such that said first force handle assembly extends laterally from said first housing, and wherein said second force handle base can be releaseably attached to said force arm such that said second force handle assembly extends laterally from said second housing.

38. The apparatus of claims 34, 35, 36, or 37, further comprising:  
20 a data acquisition system comprising a USB interface.

39. The apparatus of claim 38, further comprising a controller.